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Carlsbad Field Office
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Elizabeth Cotsworth, Director
Office of Radiation and Indoor Air
U. S. Environmental Protection Agency
Washington D.C., 20460

Subject: Response to Environmental Protection Agency (EPA) July 12, 2004 Letter on
CRA

Dear Ms. Cotsworth

In response to the EPA's letter of July 12, 2004, the U.S. Department of Energy (DOE) is providing information that answers the questions included in the enclosure to that letter.

This submittal includes two enclosures. Enclosure 1 is a hard copy of the responses. Enclosure 2 (on compact disc) provides the references for documents identified in Enclosure 1.

If you have any questions, please contact Russ Patterson of my staff at 505-234-7457.

Sincerely,

A handwritten signature in black ink, which appears to read "R. Paul Detwiler", is positioned above the printed name.

R. Paul Detwiler
Acting Manager

Enclosure

cc: w/enclosure
B. Forinash, EPA
C. Byrum, EPA
T. Peake, EPA
R. Lee, EPA
J. Schramke, Contract

cc: wo/enclosure
P. Shoemaker, SNL
N. Elkins, LANL
G. Basabilvazo, DOE
CBFO M&RC

EPA Comment

R-23-1 Waste Chemistry Reference

Provide copies of fifteen requested references cited in SOTERM and other appendices.

DOE Response

The requested references are being provided on compact disc as part of Enclosure 2:

EPA Comment**C-24-1 Appendix DATA, Attachment F, Preface**

The Preface of Appendix DATA, Attachment F, indicates that there are still inconsistencies in the Waste Stream Profiles. However, the Preface does not clearly indicate the nature of these inconsistencies. This information is necessary to verify DOE's conclusion that the inconsistencies were not significant to PA.

Provide a summary list of identified inconsistencies in the Waste Stream Profiles (per Preface to Appendix DATA, Attachment F.

DOE Response

A review of the waste profiles was completed in January 2004 (ERMS # 534062) for the following sites:

Idaho National Engineering Laboratory (INEEL),
Oak Ridge National Laboratory (ORNL),
Los Alamos National Laboratory (LANL),
Savannah River Site (SRS),
Small quantity sites.

This review indicated that there were a number of inconsistencies in the waste profiles between those reported in the TWBIR Revision 2 (DOE, 1995) and the CRA-2004. Identified inconsistencies in waste volumes, waste material parameters, and radionuclide concentration or other data used in Performance Assessment (PA) have been evaluated further. The results of this evaluation are documented in Leigh and Crawford (2004) and summarized below. The full report is also included with this submittal.

Waste Volumes

There are a number of sources of inconsistency between the final waste form volumes in TWBIR Revision 2 (DOE 1995) and those reported in the CRA-2004 (DOE 2004). The first of these is a result of changes in methodology. The final waste form volume determination in TWBIR Revision 2 (DOE 1995) does not account for overpack containers, while the CRA-2004 uses the volumes of the payload containers to account for the waste that will be shipped and ultimately emplaced in the repository.

In addition to differences in how the waste volume was reported in the CRA-2004, inconsistencies were identified from the volumes reported from three specific sites. In each of these cases, our evaluation shows that the volumes used in the CRA-2004 were correct.

- The INEEL waste stream volumes for debris and non-debris waste reported for the CRA-2004 are significantly higher than those reported for the same waste streams in the TWBIR Revision 2 (DOE 1995). This difference was due to three factors: (a) the inclusion of alpha mixed low-level waste in the CRA-2004 waste streams, (b) the applied treatment technology was changed from incineration to mechanical supercompaction for debris waste and reflected in the final form volumes for the CRA-2004, and (c)

accounting for the volume of the overpack container, rather than the individual compacted drums.

- The SRS waste stream volumes decreased for the CRA-2004 in comparison to the reported volumes for the same waste streams in the TWBIR Revision 2 (DOE 1995). This is because SRS has been actively characterizing waste for shipment to WIPP, resulting in a decrease in waste volumes determined to be TRU, and a corresponding increase in low-level waste (LLW) reported at the site. This decrease in TRU volume was factored into the SRS estimates for the CRA-2004 inventory update.
- Finally, ORNL waste volumes were found to have decreased from those identified in the TWBIR Revision 2. The volumes that ORNL plans to ship to WIPP are almost half of the estimated volumes they reported in the TWBIR Revision 2 (DOE 1995). This difference results from the anticipated use of size reduction after processing at the site.

Waste Material Parameters

The inconsistencies identified during the waste profile review that related to waste material parameters involved differences in packaging materials, differences in how sites reported cement, and the inclusion of waste material parameters that were inconsistent with waste stream descriptions:

- Approximately 23,000 kg of plastic for site packing materials was inadvertently omitted from three final form waste streams at LLNL (Lott 2004).
- The sites were not consistent in the way cement was reported for the Inventory Update for the CRA-2004. Sites reported cement in waste material parameter tables and in waste stream descriptions and other comment fields. The cement content for the repository was therefore calculated by identifying all of the waste streams that identified cement in the waste stream in waste material parameters or in comment fields (Leigh and Lott 2003). Accounting for cement content in this manner represents a more accurate and comprehensive value than previously reported.
- Finally, many sites did not update waste stream descriptors when they updated tabulated information. This caused inconsistencies between waste stream descriptions, management comments and comments about packaging and the data reported for waste material parameters.

However, these inconsistencies have no impact on data used for PA calculations because the information reported in the TWBID comment fields was not used for PA. Only the waste material parameter data fields were used for PA.

Radionuclide Inventory

A number of inconsistencies have been found in radionuclide concentrations because INEEL did not modify these concentrations for the CRA-2004 data call from those reported in the TWBIR Revision 2. These modifications were needed to account for a number of factors:

- The combination of multiple waste streams into a single, waste stream (IN-BN-510) for all waste undergoing supercompaction allows a more straightforward means of tracking and reporting the waste component values for debris category waste. The radionuclide values applied to waste stream IN-BN-510 used radionuclide activity concentrations that were identified as "Direct ship" in the TWBIR Revision 2. This assignment closely

matches the currently planned processes and is the correct assignment for radionuclides for the CRA 2004 waste streams. As with all anticipated inventory, actual values will be determined and reported more precisely for each container after characterization and prior to shipment.

- Changing the assumed final form packaging for over-packed waste: Since INEEL did not provide new radionuclide information for the AMWTF waste streams, radionuclides that were identified in TWBIR Revision 3 (DOE 1996) may be missing. This was expected to have minimal impact as the site identified radionuclides that were reported for TWBIR Revision 2 when the assignment of radionuclides was made for this waste stream.

Inconsistencies in the reporting of several radionuclides were identified during the waste profile review:

Waste profiles that did not include Am-241 when Pu-241 was present were not decay corrected. In other words, the decay of Pu-241 into Am-241 results in a positive mass of Am-241 that was missing from the profile but is included in the tables in Appendix DATA Attachment F. The waste profiles in Annexes I, J and K included only the information provided by each site and varied according to assay year or generation year. This data was decay corrected and reported in tables throughout Attachment F and Annex E that were used for the PA calculations. Therefore, there was no impact to PA calculations.

Sites did not consistently report existence of both Cs-137 and Sr-90, when one was reported and the other was not. Based on the total expected quantity of Sr-90, there is not expected to be any impact to PA calculations.

The waste profile review indicated that Ba-137 was inconsistently reported. This radionuclide is not relevant for PA calculations.

Cm-244 was identified in a single waste stream at LANL, but was determined to be insignificant for PA calculations (Leigh and Crawford 2004).

Conclusion

The DOE's evaluation focused on parameters that are important to PA, namely waste volume, waste material parameters and radionuclide inventory. The waste volume, waste material parameters and radionuclides were found to have some inconsistencies in the sense that the CRA-2004 inventory update did not contain data that is identical to that obtained for the TWBIR Revision 2. However, none of the inconsistencies found in the evaluation were found to have significant PA impact, and the values in the inventory for the CRA-2004 are considered to be more reliable and accurate than those in the CCA.

References

- DOE 1995. Transuranic Waste Baseline Inventory Report (Revision 2). DOE/CAO-95-1121. Carlsbad, NM. Department of Energy, Carlsbad Office. December 1995.
- DOE 1996 Transuranic Waste Baseline Inventory Report (Revision 3). DOE/CAO-1996-2184. Carlsbad, NM. U. S. Department of Energy.
- DOE 2004. Title 40 CFR 191 Subparts B and C Compliance Recertification Application 2004. DOE/WIPP 2004-3231, pending issue.

Summary of Review of Transuranic Waste Baseline Inventory Profile Forms Developed to Support the Compliance Recertification Application. ERMS# 534062. January 7, 2004.

Leigh and Crawford 2004. Inventory Reassessment Summary For the CRA-2004 TRU Waste Inventory. ERMS# 535837. June 24, 2004.

Leigh and Lott 2003. Estimate of Portland Cement in TRU Waste For Disposal in WIPP for the Compliance Recertification Application, supercedes ERMS# 529684, Revision 1. ERMS# 531562. Carlsbad, NM. Sandia National Laboratories.

Lott 2004. Inventory Review and Reconciliation Report: LL-001 Revision 0. ERMS # 534501. April 16, 2004.

EPA Comment**C-24-2 Appendix DATA Attachment F-2.3.1**

DOE indicated that data obtained from individual generator sites and entered into the Transuranic Waste Baseline Information Database (TWBID) were subsequently exported to, and decay-corrected through the use of, the Oak Ridge Isotope Generation code (ORIGEN), version 2.2. The decay-corrected data were then imported back into TWBID. As part of our §194.24(a) technical review of the inventory, the function of ORIGEN for the purposes of decay-correcting the data will be verified through recalculation of a randomly selected subset of the data.

To support these calculations, DOE must provide electronically the TWBID. If any modifications have been made to the off-the-shelf ORIGEN code for decay correction, DOE must also describe the changes and provide an electronic version of the modified ORIGEN code. Finally, DOE must provide all relevant quality assurance (QA) documents listed in Table DATA- F-4 and applicable to codes used in performance assessment. These documents include the Access Control Memorandum, Requirements Document, Code Classification of ORIGEN (version 2.2), Verification and Validation Plan, and Validation Document. The documents are necessary to demonstrate proper review, verification, and implementation of the ORIGEN 2.2 software.

DOE Response

The Transuranic Waste Baseline Inventory Database used to supply data for performance assessment (TWBID Revision 2.1 Data version 4.09) has been provided to EPA in response to comment G-3 submitted in July.

There were no modifications made to the ORIGEN2 software. However, an interface spreadsheet was used to transfer the data from TWBID to the ORIGEN2 application. A copy of this spreadsheet (TransOrigen D.4.09.xls (populated)) and a blank spreadsheet application (TransOrigen.xls) has been enclosed on the CD in Enclosure 2 as part of the response to this comment along with an instruction sheet (TransOrigen Description & Application.doc) for its use.

Validation documentation is also provided in Enclosure 2 as follows:

ORIGEN2 Version 2.2 Access Control Memo ERMS# 525783

ORIGEN2 Version 2.2 Requirements Document ERMS# 525785

ORIGEN2 Version 2.2 Code Classification Memo, ERMS# 525790

ORIGEN2 Version 2.2 Verification and Validation Plan and Validation Document ERMS# 525786 (Document version 1.00 dated February 7, 2003)

ORIGEN2 Version 2.2 Verification and Validation Plan and Validation Document ERMS# 525718 (Document version 1.10 dated June 2004)

EPA Comment**C-24-3 Section 4.4.1**

Quality assurance objectives (QAOs) previously identified in the 1998 Compliance Certification Application have been removed from the CRA with respect to acceptable knowledge and non-destructive examination. Although these requirements are included in the Contact-Handled Waste Acceptance Plan (CH WAP) the WAP is a RCRA-based document and does not deal with QAOs related to radiological components. The absence of radiological QAOs in the CRA documentation is troubling since it may imply that sites are not applying consistent criteria in implementing waste characterization.

A. Explain why the CRA does not include QAOs for acceptable knowledge and non-destructive examination.

B. Describe what criteria are being applied at sites.

C. Explain how these criteria ensure that appropriate data is being collected.

Response

The CRA does not contain Quality Assurance Objectives (QAOs) because the waste characterization requirements for waste destined for the WIPP are contained in the CH TRU WAC, Rev 1 (DOE/WIPP 02-3122 (3/1/04) and the Waste Analysis Plan (WAP) (Attachment B to the WIPP Hazardous Waste Facility Permit). The EPA is correct that the WAP pertains to chemical waste characterization for hazardous waste components and the associated QAOs contained in that document do not necessarily pertain to radiological components directly. However, the Contact Handled –Waste Acceptance Criteria (CH-WAC) is the primary directive for ensuring that TRU waste is managed and disposed of in a manner that protects human health and safety and the environment. Analogous to the WAP, waste radioassay characterization is conducted according to requirements established within the CH-WAC. Section 4.0 of the WAC defines the Quality Assurance (QA) program requirements that provide the confidence that TRU waste characterization activities are properly performed by the generator site.

The QAOs, defined in Section A.6 of the CH-WAC, are qualitative and quantitative statements that specify WIPP technical and quality objectives. A copy of the current version of the CH-WAC has been included as part of this response for easy reference.

Acceptable Knowledge (AK) and non-destructive examination (NDE) details are provided in the CH-WAC Appendix A, Section A.2.1 and A.4.2, respectively. When using AK information to characterize TRU waste, the AK documentation is compiled in an auditable record. The AK information is then confirmed and AK records are audited. The AK process and waste stream documentation is then evaluated through internal assessments by internal QA organizations and by auditors external to the organization (i.e., CBFO). When using NDE, all activities must be described in the sites Quality Assurance Project Plans and Standard Operating Procedures. As a quality control check on NDE, a statically determined number of containers are randomly selected and visually examined.

Reference

Contact-Handled Transuranic Waste Acceptance Criteria, Rev 1, DOE/WIPP 02-3122 (3/1/04).

EPA Comment
C-24-4 Section 4.3.2

The CRA indicates that the WIPP Waste Information System (WWIS) is an important component of the waste inventory system of controls mandated by §194.24. EPA found that some WWIS data fields included in the original application have been deleted from the CRA (see Docket No. A-93-02, V-B-15, Chapter 6). Data fields such as transuranic (TRU) alpha activity, TRU alpha uncertainty, waste matrix parameters with weights, and waste matrix code are important for inventory calculations. Similarly, an assay-method field tells whether approved equipment has been used to characterize a transuranic waste drum. DOE must provide a justification for the addition or removal of WWIS data fields.

DOE Response

DOE has made an effort in the CRA to provide information that is focused on demonstrating compliance with the requirements of 40 CFR Parts 191 and 194, and to minimize the presentation of information that is not directly relevant. As such, the list of data fields included in Section 4.3.2 of the CRA has been edited to include only those data fields that are directly relevant to demonstrating compliance with §194.24.

More specifically, the list included in Section 4.3.2 has been revised to focus on satisfying the information needs represented by the "Components Requiring Quantification" as listed in CRA Table 4-11. This needed information is provided by the list of seven data fields provided at the end of Section 4.3.2.

Also, many other data fields continue to be maintained in the WWIS; they are not listed in CRA Section 4.3.2, however, because they address other program needs and they are not directly relevant to demonstrating compliance with the provisions of §194.24. As indicated in the text, the updated list of WWIS data fields appears in the WWIS user's manual (U.S. Department of Energy, 2001, WIPP Waste Information System User's Manual for Use by Shippers/Generators, DOE/CAO 97-2273).

The following data fields continue to be maintained in the WWIS that are related to inventory limit tracking, quality assurance and site certification requirements:

- Pu-239 fissile gram equivalent
- Radionuclide activity
- Radionuclide activity uncertainty
- Radionuclide mass
- TRU alpha activity
- TRU alpha activity uncertainty
- WAC certification data
- Waste Material Parameters
- Waste Matrix Codes

Reference

U.S. Department of Energy, 2001, WIPP Waste Information System User's Manual for Use by Shippers/Generators, DOE/CAO 97-2273, Carlsbad Field Office, Carlsbad, NM.